

Message

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**From:** CN=Phil North/OU=R10/O=USEPA/C=US [CN=Phil North/OU=R10/O=USEPA/C=US]  
**Sent:** 10/13/2011 6:44:11 PM  
**To:** Daniel Schindler [deschind@uw.edu]  
**CC:** andjr@uaa.alaska.edu;rsshaftel@uaa.alaska.edu;Thomas P Quinn [tquinn@u.washington.edu];  
sshaftel@uaa.alaska.edu;Thomas P Quinn [tquinn@u.washington.edu]; homas P Quinn [tquinn@u.washington.edu]  
**Subject:** Re: Salmon derived nutrients moving into Bristol Bay  
**Attachments:** tquinn@u.washington.edu; North.Phil@epamail.epa.gov; (907) 714-2483; north.phil@epa.gov

As you surmised, I was interested in the marine ecosystem question. I will be in Anchorage tomorrow and chat with Dan and Becky to see if the freshwater information is useful for the work he is doing.

Thanks  
Phil

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"To protect your rivers, protect your mountains."

From: Daniel Schindler <deschind@uw.edu>  
To: Thomas P Quinn <tquinn@u.washington.edu>  
Cc: Phil North/R10/USEPA/US@EPA, andjr@uaa.alaska.edu, rsshaftel@uaa.alaska.edu  
Date: 10/13/2011 07:06 AM  
Subject: Re: Salmon derived nutrients moving into Bristol Bay

Phil,  
After thinking about this some more, I realized that the 30% number I gave you for the proportion of MDN in the lakes and rivers of BB might be a bit high. The figure in the Naiman paper includes several lakes from Kodiak Island that have substantially higher salmon densities compared to Bristol Bay. Since we published that paper I have collected sediment isotope data from nearly all of the BB lakes but have not published them yet. I could provide you with an unpublished estimate for the Kvichak and Wood River based on isotope data from those lakes specifically, if that would be more useful to you. Just let me know.  
Daniel

On Thu, Oct 13, 2011 at 7:08 AM, Thomas P Quinn <tquinn@u.washington.edu> wrote:  
Daniel,  
Thanks for commenting on this.

Phil - I have nothing to add to what Daniel has said,  
Tom

On Wed, 12 Oct 2011, Daniel Schindler wrote:

Hi Phil,  
I do not know of any full assessment of marine-derived nutrients flowing back from the rivers to Bristol Bay. Nutrients could move through two primary mechanisms: 1) smolts leaving rivers and carrying back some of their maternally-derived or ecosystem-derived

nutrients, and 2) hydrologic flushing back to the ocean. I've attached a paper where we estimated #1 and not-surprisingly, it is not a very big number. For #2 you really need good hydrologic estimates to get believable numbers for the nutrient fluxes. That said, we do

know that the lakes are strongly phosphorus limited and that most of the marine-derived P likely sediments out into the lakes of the region as the plankton there will strip it out of the water. Marine-derived N is more likely to be flushed out of the system but the reality is that these systems are awash in N so the marine-derived component of it is relatively small. Using stable isotopes of N I estimated that the freshwater ecosystems of Bristol Bay have about 30% marine-derived N in them (see section in Naiman et al. paper).

I have talked with various folks who have wondered whether salmon returns to rivers of BB could benefit marine systems as the marine-derived nutrients leak their way back out to the ocean. Not sure if this is where you are going with your question but I think that such a mechanism is very unlikely to be important to the nutrient budgets of the nearshore marine ecosystems.

I hope this is helpful.

Cheers,  
Daniel

On Wed, Oct 12, 2011 at 5:53 PM, <North.Phil@epamail.epa.gov> wrote:

Tom and Dan,  
Do you know if anyone has attempted to estimate the amount or portion of salmon derived nutrients that move out of the Nushagak (including Wood R) and Kvichak River systems into Bristol Bay? I suppose it does not have to be those rivers. I know there are estimates on the efficiency of salmon streams in retaining marine derived nutrients. I am not current with the literature. Can you offer of citation or two?

Phil

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